SQL LANGUAGE REFERENCE

The SQL SELECT Statement

The SELECT statement is used to select data from a table. The tabular result is stored in a result table (called the result-set).

Syntax

```
SELECT column_name(s)
FROM table_name
```

Note: SQL statements are not case sensitive. SELECT is the same as select.

SQL SELECT Example

To select the content of columns named "LastName" and "FirstName", from the database table called "Persons", use a SELECT statement like this:

```
SELECT LastName,FirstName FROM Persons
```

The database table "Persons":

LastName	FirstName	Address	City
Hansen	Ola	Timoteivn 10	Sandnes
Svendson	Tove	Borgvn 23	Sandnes
Pettersen	Kari	Storgt 20	Stavanger

The result

LastName	FirstName
Hansen	Ola
Svendson	Tove
Pettersen	Kari

Select All Columns

To select all columns from the "Persons" table, use a * symbol instead of column names, like this:

```
SELECT * FROM Persons
```

Result

LastName	FirstName	Address	City
Hansen	Ola	Timoteivn 10	Sandnes
Svendson	Tove	Borgvn 23	Sandnes
Pettersen	Kari	Storgt 20	Stavanger

The Result Set

The result from a SQL query is stored in a result-set. Most database software systems allow navigation of the result set with programming functions, like: Move-To-First-Record, Get-Record-Content, Move-To-Next-Record, etc.

Programming functions like these are not a part of this tutorial. To learn about accessing data with function calls, please visit our ADO tutorial.

Semicolon after SQL Statements?

Semicolon is the standard way to separate each SQL statement in database systems that allow more than one SQL statement to be executed in the same call to the server.

Some SQL tutorials end each SQL statement with a semicolon. Is this necessary? We are using MS Access and SQL Server 2000 and we do not have to put a semicolon after each SQL statement, but some database programs force you to use it.

The SELECT DISTINCT Statement

The DISTINCT keyword is used to return only distinct (different) values.

The SELECT statement returns information from table columns. But what if we only want to select distinct elements?

With SQL, all we need to do is to add a DISTINCT keyword to the SELECT statement:

Syntax

```
SELECT DISTINCT column_name(s)
FROM table_name
```

Using the DISTINCT keyword

To select ALL values from the column named "Company" we use a SELECT statement like this:

```
SELECT Company FROM Orders
```

"Orders" table

Company	OrderNumber
Sega	3412
W3Schools	2312
Trio	4678
W3Schools	6798

Result

Company
Sega
W3Schools
Trio
W3Schools

Note that "W3Schools" is listed twice in the result-set.

To select only DIFFERENT values from the column named "Company" we use a SELECT DISTINCT statement like this:

```
SELECT DISTINCT Company FROM Orders
```

Result:

Company
Sega
W3Schools
Trio

Now "W3Schools" is listed only once in the result-set.

The WHERE clause is used to specify a selection criterion.

The WHERE Clause

To conditionally select data from a table, a WHERE clause can be added to the SELECT statement.

Syntax

```
SELECT column FROM table
WHERE column operator value
```

With the WHERE clause, the following operators can be used:

Operator	Description
=	Equal
<>	Not equal
>	Greater than
<	Less than
>=	Greater than or equal
<=	Less than or equal
BETWEEN	Between an inclusive range
LIKE	Search for a pattern
IN	If you know the exact value you want to return for at least one of the columns

Note: In some versions of SQL the <> operator may be written as !=

Using the WHERE Clause

To select only the persons living in the city "Sandnes", we add a WHERE clause to the SELECT statement:

```
SELECT * FROM Persons
WHERE City='Sandnes'
```

"Persons" table

LastName	FirstName	Address	City	Year
Hansen	Ola	Timoteivn 10	Sandnes	1951
Svendson	Tove	Borgvn 23	Sandnes	1978
Svendson	Stale	Kaivn 18	Sandnes	1980
Pettersen	Kari	Storgt 20	Stavanger	1960

Result

LastName	FirstName	Address	City	Year
Hansen	Ola	Timoteivn 10	Sandnes	1951
Svendson	Tove	Borgvn 23	Sandnes	1978
Svendson	Stale	Kaivn 18	Sandnes	1980

Using Quotes

Note that we have used single quotes around the conditional values in the examples.

SQL uses single quotes around text values (most database systems will also accept double quotes). Numeric values should not be enclosed in quotes.

For text values:

```
This is correct:
SELECT * FROM Persons WHERE FirstName='Tove'
This is wrong:
SELECT * FROM Persons WHERE FirstName=Tove
```

For numeric values:

```
This is correct:
SELECT * FROM Persons WHERE Year>1965
This is wrong:
SELECT * FROM Persons WHERE Year>'1965'
```

The LIKE Condition

The LIKE condition is used to specify a search for a pattern in a column.

Syntax

```
SELECT column FROM table
WHERE column LIKE pattern
```

A "%" sign can be used to define wildcards (missing letters in the pattern) both before and after the pattern.

Using LIKE

The following SQL statement will return persons with first names that start with an 'O':

```
SELECT * FROM Persons
WHERE FirstName LIKE 'O%'
```

The following SQL statement will return persons with first names that end with an 'a':

```
SELECT * FROM Persons
WHERE FirstName LIKE '%a'
```

The following SQL statement will return persons with first names that contain the pattern 'la':

```
SELECT * FROM Persons
WHERE FirstName LIKE '%la%'
```

The INSERT INTO Statement

The INSERT INTO statement is used to insert new rows into a table.

Syntax

```
INSERT INTO table_name
VALUES (value1, value2,....)
```

You can also specify the columns for which you want to insert data:

```
INSERT INTO table_name (column1, column2,...)
VALUES (value1, value2,....)
```

Insert a New Row

This "Persons" table:

LastName	FirstName	Address	City
Pettersen	Kari	Storgt 20	Stavanger

And this SQL statement:

```
INSERT INTO Persons
VALUES ('Hetland', 'Camilla', 'Hagabakka 24', 'Sandnes')
```

Will give this result:

LastName	FirstName	Address	City
Pettersen	Kari	Storgt 20	Stavanger
Hetland	Camilla	Hagabakka 24	Sandnes

Insert Data in Specified Columns

This "Persons" table:

LastName	FirstName	Address	City
Pettersen	Kari	Storgt 20	Stavanger
Hetland	Camilla	Hagabakka 24	Sandnes

And This SQL statement:

```
INSERT INTO Persons (LastName, Address)
VALUES ('Rasmussen', 'Storgt 67')
```

Will give this result:

LastName	FirstName	Address	City
Pettersen	Kari	Storgt 20	Stavanger
Hetland	Camilla	Hagabakka 24	Sandnes
Rasmussen		Storgt 67	

The Update Statement

The UPDATE statement is used to modify the data in a table.

Syntax

```
UPDATE table_name
SET column_name = new_value
WHERE column_name = some_value
```

Person:

LastName	FirstName	Address	City
Nilsen	Fred	Kirkegt 56	Stavanger
Rasmussen		Storgt 67	

Update one Column in a Row

We want to add a first name to the person with a last name of "Rasmussen":

```
UPDATE Person SET FirstName = 'Nina'
WHERE LastName = 'Rasmussen'
```

Result:

LastName	FirstName	Address	City
Nilsen	Fred	Kirkegt 56	Stavanger
Rasmussen	Nina	Storgt 67	

Update several Columns in a Row

We want to change the address and add the name of the city:

```
UPDATE Person
SET Address = 'Stien 12', City = 'Stavanger'
WHERE LastName = 'Rasmussen'
```

Result:

LastName	FirstName	Address	City
Nilsen	Fred	Kirkegt 56	Stavanger
Rasmussen	Nina	Stien 12	Stavanger

The DELETE Statement

The DELETE statement is used to delete rows in a table.

Syntax

```
DELETE FROM table_name
WHERE column_name = some_value
```

Person:

LastName	FirstName	Address	City
Nilsen	Fred	Kirkegt 56	Stavanger
Rasmussen	Nina	Stien 12	Stavanger

Delete a Row

"Nina Rasmussen" is going to be deleted:

```
DELETE FROM Person WHERE LastName = 'Rasmussen'
```

Result

LastName	FirstName	Address	City
Nilsen	Fred	Kirkegt 56	Stavanger

Delete All Rows

It is possible to delete all rows in a table without deleting the table. This means that the table structure, attributes, and indexes will be intact:

```
DELETE FROM table_name
or
DELETE * FROM table_name
```

Examples

Try it Yourself

To see how SQL works, you can copy the SQL statements below and paste them into the textarea, or you can make your own SQL statements.

```
SELECT * FROM customers
```

```
SELECT CompanyName, ContactName
FROM customers
```

```
SELECT * FROM customers
WHERE companyname LIKE 'a%'
```

```
SELECT CompanyName, ContactName
FROM customers
WHERE CompanyName > 'a'
```

When using SQL on text data, "alfred" is greater than "a" (like in a dictionary).

```
SELECT CompanyName, ContactName
FROM customers
WHERE CompanyName > 'g'
AND ContactName > 'g'
```

Sort the Rows

The ORDER BY clause is used to sort the rows.

Orders:

Company	OrderNumber
Sega	3412
ABC Shop	5678
W3Schools	6798
W3Schools	2312

Example

To display the company names in alphabetical order:

```
SELECT Company, OrderNumber FROM Orders
ORDER BY Company
```

Result:

Company	OrderNumber
ABC Shop	5678
Sega	3412
W3Schools	6798
W3Schools	2312

Example

To display the company names in alphabetical order AND the OrderNumber in numerical order:

```
SELECT Company, OrderNumber FROM Orders
ORDER BY Company, OrderNumber
```

Result:

Company	OrderNumber
ABC Shop	5678
Sega	3412
W3Schools	2312
W3Schools	6798

Example

To display the company names in reverse alphabetical order:

```
SELECT Company, OrderNumber FROM Orders
ORDER BY Company DESC
```

Result:

Company	OrderNumber
W3Schools	6798
W3Schools	2312
Sega	3412
ABC Shop	5678

Example

To display the company names in reverse alphabetical order AND the OrderNumber in numerical order:

```
SELECT Company, OrderNumber FROM Orders
ORDER BY Company DESC, OrderNumber ASC
```

Result:

Company	OrderNumber
W3Schools	2312
W3Schools	6798
Sega	3412
ABC Shop	5678

Notice that there are two equal company names (W3Schools) in the result above. The only time you will see the second column in ASC order would be when there are duplicated values in the first sort column, or a handful of nulls.

AND & OR

AND and OR join two or more conditions in a WHERE clause.

The AND operator displays a row if ALL conditions listed are true. The OR operator displays a row if ANY of the conditions listed are true.

Original Table (used in the examples)

LastName	FirstName	Address	City
Hansen	Ola	Timoteivn 10	Sandnes
Svendson	Tove	Borgvn 23	Sandnes
Svendson	Stephen	Kaivn 18	Sandnes

Example

Use AND to display each person with the first name equal to "Tove", and the last name equal to "Svendson":

```
SELECT * FROM Persons
WHERE FirstName='Tove'
AND LastName='Svendson'
```

Result:

LastName	FirstName	Address	City
Svendson	Tove	Borgvn 23	Sandnes

Example

Use OR to display each person with the first name equal to "Tove", or the last name equal to "Svendson":

```
SELECT * FROM Persons
WHERE firstname='Tove'
OR lastname='Svendson'
```

Result:

LastName	FirstName	Address	City
Svendson	Tove	Borgvn 23	Sandnes
Svendson	Stephen	Kaivn 18	Sandnes

Example

You can also combine AND and OR (use parentheses to form complex expressions):

```
SELECT * FROM Persons WHERE
(FirstName='Tove' OR FirstName='Stephen')
AND LastName='Svendson'
```

Result:

LastName	FirstName	Address	City
Svendson	Tove	Borgvn 23	Sandnes
Svendson	Stephen	Kaivn 18	Sandnes

IN

The IN operator may be used if you know the exact value you want to return for at least one of the columns.

```
SELECT column_name FROM table_name
WHERE column_name IN (value1,value2,..)
```

Original Table (used in the examples)

LastName	FirstName	Address	City
Hansen	Ola	Timoteivn 10	Sandnes
Nordmann	Anna	Neset 18	Sandnes
Pettersen	Kari	Storgt 20	Stavanger
Svendson	Tove	Borgvn 23	Sandnes

Example 1

To display the persons with LastName equal to "Hansen" or "Pettersen", use the following SQL:

```
SELECT * FROM Persons
WHERE LastName IN ('Hansen','Pettersen')
```

Result:

LastName	FirstName	Address	City
Hansen	Ola	Timoteivn 10	Sandnes
Pettersen	Kari	Storgt 20	Stavanger

BETWEEN ... AND

The BETWEEN ... AND operator selects a range of data between two values. These values can be numbers, text, or dates.

```
SELECT column_name FROM table_name
WHERE column_name
BETWEEN value1 AND value2
```

Original Table (used in the examples)

LastName	FirstName	Address	City
Hansen	Ola	Timoteivn 10	Sandnes
Nordmann	Anna	Neset 18	Sandnes
Pettersen	Kari	Storgt 20	Stavanger
Svendson	Tove	Borgvn 23	Sandnes

Example 1

To display the persons alphabetically between (and including) "Hansen" and exclusive "Pettersen", use the following SQL:

```
SELECT * FROM Persons WHERE LastName
BETWEEN 'Hansen' AND 'Pettersen'
```

Result:

LastName	FirstName	Address	City
Hansen	Ola	Timoteivn 10	Sandnes
Nordmann	Anna	Neset 18	Sandnes

IMPORTANT! The BETWEEN...AND operator is treated differently in different databases. With some databases a person with the LastName of "Hansen" or "Pettersen" will not be listed (BETWEEN..AND only selects fields that are between and excluding the test values). With some databases a person with the last name of "Hansen" or "Pettersen" will be listed (BETWEEN..AND selects fields that are between and including the test values). With other databases a person with the last name of "Hansen" will be listed, but "Pettersen" will not be listed (BETWEEN..AND selects fields between the test values, including the first test value and excluding the last test value). Therefore: Check how your database treats the BETWEEN....AND operator!

Example 2

To display the persons outside the range used in the previous example, use the NOT operator:

```
SELECT * FROM Persons WHERE LastName
NOT BETWEEN 'Hansen' AND 'Pettersen'
```

Result:

LastName	FirstName	Address	City
Pettersen	Kari	Storgt 20	Stavanger
Svendson	Tove	Borgvn 23	Sandnes

With SQL, aliases can be used for column names and table names.

Column Name Alias

The syntax is:

```
SELECT column AS column_alias FROM table
```

Table Name Alias

The syntax is:

```
SELECT column FROM table AS table_alias
```

Example: Using a Column Alias

This table (Persons):

LastName	FirstName	Address	City
Hansen	Ola	Timoteivn 10	Sandnes
Svendson	Tove	Borgvn 23	Sandnes
Pettersen	Kari	Storgt 20	Stavanger

And this SQL:

```
SELECT LastName AS Family, FirstName AS Name
FROM Persons
```

Returns this result:

Family	Name
Hansen	Ola
Svendson	Tove
Pettersen	Kari

Example: Using a Table Alias

This table (Persons):

LastName	FirstName	Address	City
Hansen	Ola	Timoteivn 10	Sandnes
Svendson	Tove	Borgvn 23	Sandnes
Pettersen	Kari	Storgt 20	Stavanger

And this SQL:

```
SELECT LastName, FirstName
FROM Persons AS Employees
```

Returns this result:

Table Employees:

LastName	FirstName
Hansen	Ola
Svendson	Tove
Pettersen	Kari

Joins and Keys

Sometimes we have to select data from two or more tables to make our result complete. We have to perform a join.

Tables in a database can be related to each other with keys. A primary key is a column with a unique value for each row. Each primary key value must be unique within the table. The purpose is to bind data together, across tables, without repeating all of the data in every table.

In the "Employees" table below, the "Employee_ID" column is the primary key, meaning that **no** two rows can have the same Employee_ID. The Employee_ID distinguishes two persons even if they have the same name.

When you look at the example tables below, notice that:

- The "Employee_ID" column is the primary key of the "Employees" table
- The "Prod_ID" column is the primary key of the "Orders" table
- The "Employee_ID" column in the "Orders" table is used to refer to the persons in the "Employees" table without using their names

Employees:

Employee_ID	Name
01	Hansen, Ola
02	Svendson, Tove
03	Svendson, Stephen
04	Pettersen, Kari

Orders:

Prod_ID	Product	Employee_ID
234	Printer	01
657	Table	03
865	Chair	03

Referring to Two Tables

We can select data from two tables by referring to two tables, like this:

Example

Who has ordered a product, and what did they order?

```
SELECT Employees.Name, Orders.Product
FROM Employees, Orders
WHERE Employees.Employee_ID=Orders.Employee_ID
```

Result

Name	Product
Hansen, Ola	Printer
Svendson, Stephen	Table
Svendson, Stephen	Chair

Example

Who ordered a printer?

```
SELECT Employees.Name
FROM Employees, Orders
WHERE Employees.Employee_ID=Orders.Employee_ID
AND Orders.Product='Printer'
```

Result

Name
Hansen, Ola

Using Joins

OR we can select data from two tables with the JOIN keyword, like this:

Example INNER JOIN

Syntax

```
SELECT field1, field2, field3
FROM first_table
INNER JOIN second_table
ON first_table.keyfield = second_table.foreign_keyfield
```

Who has ordered a product, and what did they order?

```
SELECT Employees.Name, Orders.Product
FROM Employees
INNER JOIN Orders
ON Employees.Employee_ID=Orders.Employee_ID
```

The INNER JOIN returns all rows from both tables where there is a match. If there are rows in Employees that do not have matches in Orders, those rows will **not** be listed.

Result

Name	Product
Hansen, Ola	Printer
Svendson, Stephen	Table
Svendson, Stephen	Chair

Example LEFT JOIN

Syntax

```
SELECT field1, field2, field3
FROM first_table
LEFT JOIN second_table
ON first_table.keyfield = second_table.foreign_keyfield
```

List all employees, and their orders - if any.

```
SELECT Employees.Name, Orders.Product
FROM Employees
LEFT JOIN Orders
ON Employees.Employee_ID=Orders.Employee_ID
```

The LEFT JOIN returns all the rows from the first table (Employees), even if there are no matches in the second table (Orders). If there are rows in Employees that do not have matches in Orders, those rows **also** will be listed.

Result

Name	Product
Hansen, Ola	Printer
Svendson, Tove	
Svendson, Stephen	Table
Svendson, Stephen	Chair
Pettersen, Kari	

Example RIGHT JOIN

Syntax

```
SELECT field1, field2, field3
FROM first_table
RIGHT JOIN second_table
ON first_table.keyfield = second_table.foreign_keyfield
```

List all orders, and who has ordered - if any.

```
SELECT Employees.Name, Orders.Product
FROM Employees
RIGHT JOIN Orders
ON Employees.Employee_ID=Orders.Employee_ID
```

The RIGHT JOIN returns all the rows from the second table (Orders), even if there are no matches in the first table (Employees). If there had been any rows in Orders that did not have matches in Employees, those rows **also** would have been listed.

Result

Name	Product
Hansen, Ola	Printer
Svendson, Stephen	Table
Svendson, Stephen	Chair

Example

Who ordered a printer?

```
SELECT Employees.Name
FROM Employees
INNER JOIN Orders
ON Employees.Employee_ID=Orders.Employee_ID
WHERE Orders.Product = 'Printer'
```

Result

Name
Hansen, Ola

UNION

The UNION command is used to select related information from two tables, much like the JOIN command. However, when using the UNION command all selected columns need to be of the same data type.

Note: With UNION, only distinct values are selected.

```
SQL Statement 1
UNION
SQL Statement 2
```

Employees_Norway:

E_ID	E_Name
01	Hansen, Ola
02	Svendson, Tove
03	Svendson, Stephen
04	Pettersen, Kari

Employees_USA:

E_ID	E_Name
01	Turner, Sally
02	Kent, Clark
03	Svendson, Stephen
04	Scott, Stephen

Using the UNION Command

Example

List all different employee names in Norway and USA:

```
SELECT E_Name FROM Employees_Norway
UNION
SELECT E_Name FROM Employees_USA
```

Result

E_Name
Hansen, Ola
Svendson, Tove
Svendson, Stephen
Pettersen, Kari
Turner, Sally
Kent, Clark
Scott, Stephen

Note: This command cannot be used to list all employees in Norway and USA. In the example above we have two employees with equal names, and only one of them is listed. The UNION command only selects distinct values.

UNION ALL

The UNION ALL command is equal to the UNION command, except that UNION ALL selects all values.

```
SQL Statement 1
UNION ALL
SQL Statement 2
```

Using the UNION ALL Command

Example

List all employees in Norway and USA:

```
SELECT E_Name FROM Employees_Norway
UNION ALL
SELECT E_Name FROM Employees_USA
```

Result

E_Name
Hansen, Ola
Svendson, Tove
Svendson, Stephen
Pettersen, Kari
Turner, Sally
Kent, Clark
Svendson, Stephen
Scott, Stephen

Create a Database

To create a database:

```
CREATE DATABASE database_name
```

Create a Table

To create a table in a database:

```
CREATE TABLE table_name
(
column_name1 data_type,
column_name2 data_type,
.......
)
```

Example

This example demonstrates how you can create a table named "Person", with four columns. The column names will be "LastName", "FirstName", "Address", and "Age":

```
CREATE TABLE Person
(
LastName varchar,
FirstName varchar,
Address varchar,
Age int
)
```

This example demonstrates how you can specify a maximum length for some columns:

```
CREATE TABLE Person
(
LastName varchar(30),
FirstName varchar,
Address varchar,
Age int(3)
)
```

The data type specifies what type of data the column can hold. The table below contains the most common data types in SQL:

Data Type	Description
integer(size) int(size) smallint(size) tinyint(size)	Hold integers only. The maximum number of digits are specified in parenthesis.
decimal(size,d) numeric(size,d)	Hold numbers with fractions. The maximum number of digits are specified in "size". The maximum number of digits to the right of the decimal is specified in "d".
char(size)	Holds a fixed length string (can contain letters, numbers, and special characters). The fixed size is specified in parenthesis.
varchar(size)	Holds a variable length string (can contain letters, numbers, and special characters). The maximum size is specified in parenthesis.
date(yyyymmdd)	Holds a date

Create Index

Indices are created in an existing table to locate rows more quickly and efficiently. It is possible to create an index on one or more columns of a table, and each index is given a name. The users cannot see the indexes, they are just used to speed up queries.

Note: Updating a table containing indexes takes more time than updating a table without, this is because the indexes also need an update. So, it is a good idea to create indexes only on columns that are often used for a search.

A Unique Index

Creates a unique index on a table. A unique index means that two rows cannot have the same index value.

```
CREATE UNIQUE INDEX index_name
ON table_name (column_name)
```

The "column_name" specifies the column you want indexed.

A Simple Index

Creates a simple index on a table. When the UNIQUE keyword is omitted, duplicate values are allowed.

```
CREATE INDEX index_name
ON table name (column name)
```

The "column_name" specifies the column you want indexed.

Example

This example creates a simple index, named "PersonIndex", on the LastName field of the Person table:

```
CREATE INDEX PersonIndex
ON Person (LastName)
```

If you want to index the values in a column in **descending** order, you can add the reserved word **DESC** after the column name:

```
CREATE INDEX PersonIndex
ON Person (LastName DESC)
```

If you want to index more than one column you can list the column names within the parentheses, separated by commas:

```
CREATE INDEX PersonIndex
ON Person (LastName, FirstName)
```

Drop Index

You can delete an existing index in a table with the DROP INDEX statement.

Syntax for Microsoft SQLJet (and Microsoft Access):

```
DROP INDEX index_name ON table_name
```

Syntax for MS SQL Server:

```
DROP INDEX table_name.index_name
```

Syntax for IBM DB2 and Oracle:

```
DROP INDEX index_name
```

Syntax for MySQL:

```
ALTER TABLE table_name DROP INDEX index_name
```

Delete a Table or Database

To delete a table (the table structure, attributes, and indexes will also be deleted):

```
DROP TABLE table_name
```

To delete a database:

```
DROP DATABASE database_name
```

Truncate a Table

What if we only want to get rid of the data inside a table, and not the table itself? Use the TRUNCATE TABLE command (deletes only the data inside the table):

```
TRUNCATE TABLE table_name
```

ALTER TABLE

The ALTER TABLE statement is used to add or drop columns in an existing table.

```
ALTER TABLE table_name
ADD column_name datatype
ALTER TABLE table_name
DROP COLUMN column_name
```

Note: Some database systems don't allow the dropping of a column in a database table (DROP COLUMN column_name).

Person:

LastName	FirstName	Address
Pettersen	Kari	Storgt 20

Example

To add a column named "City" in the "Person" table:

```
ALTER TABLE Person ADD City varchar(30)
```

Result:

LastName	FirstName	Address	City
Pettersen	Kari	Storgt 20	

Example

To drop the "Address" column in the "Person" table:

```
ALTER TABLE Person DROP COLUMN Address
```

Result:

LastName	FirstName	City
Pettersen	Kari	

SQL has a lot of built-in functions for counting and calculations.

Function Syntax

The syntax for built-in SQL functions is:

```
SELECT function(column) FROM table
```

Types of Functions

There are several basic types and categories of functions in SQL. The basic types of functions are:

- Aggregate Functions
- Scalar functions

Aggregate functions

Aggregate functions operate against a collection of values, but return a single value.

Note: If used among many other expressions in the item list of a SELECT statement, the SELECT must have a GROUP BY clause!!

"Persons" table (used in most examples)

Name	Age
Hansen, Ola	34
Svendson, Tove	45
Pettersen, Kari	19

Aggregate functions in MS Access

Function	Description
AVG(column)	Returns the average value of a column
COUNT(column)	Returns the number of rows (without a NULL value) of a column
COUNT(*)	Returns the number of selected rows
FIRST(column)	Returns the value of the first record in a specified field
LAST(column)	Returns the value of the last record in a specified field
MAX(column)	Returns the highest value of a column
MIN(column)	Returns the lowest value of a column
STDEV(column)	
STDEVP(column)	
SUM(column)	Returns the total sum of a column
VAR(column)	
VARP(column)	

Aggregate functions in SQL Server

Function	Description
AVG(column)	Returns the average value of a column
BINARY_CHECKSUM	
CHECKSUM	
CHECKSUM_AGG	
COUNT(column)	Returns the number of rows (without a NULL value) of a column
COUNT(*)	Returns the number of selected rows
COUNT(DISTINCT column)	Returns the number of distinct results
FIRST(column)	Returns the value of the first record in a specified field (not supported in SQLServer2K)
LAST(column)	Returns the value of the last record in a specified field (not supported in SQLServer2K)
MAX(column)	Returns the highest value of a column
MIN(column)	Returns the lowest value of a column
STDEV(column)	
STDEVP(column)	
SUM(column)	Returns the total sum of a column
VAR(column)	
VARP(column)	

Scalar functions

Scalar functions operate against a single value, and return a single value based on the input value.

Useful Scalar Functions in MS Access

Function	Description
UCASE(c)	Converts a field to upper case
LCASE(c)	Converts a field to lower case
MID(c,start[,end])	Extract characters from a text field
LEN(c)	Returns the length of a text field
INSTR(c,char)	Returns the numeric position of a named character within a text field
LEFT(c,number_of_char)	Return the left part of a text field requested
RIGHT(c,number_of_char)	Return the right part of a text field requested
ROUND(c,decimals)	Rounds a numeric field to the number of decimals specified
MOD(x,y)	Returns the remainder of a division operation
NOW()	Returns the current system date
FORMAT(c,format)	Changes the way a field is displayed
DATEDIFF(d,date1,date2)	Used to perform date calculations

Aggregate functions (like SUM) often need an added GROUP BY functionality.

GROUP BY...

GROUP BY... was added to SQL because aggregate functions (like SUM) return the aggregate of all column values every time they are called, and without the GROUP BY function it was impossible to find the sum for each individual group of column values.

The syntax for the GROUP BY function is:

```
SELECT column,SUM(column) FROM table GROUP BY column
```

GROUP BY Example

This "Sales" Table:

Company	Amount
W3Schools	5500
IBM	4500
W3Schools	7100

And This SQL:

```
SELECT Company, SUM(Amount) FROM Sales
```

Returns this result:

Company	SUM(Amount)
W3Schools	17100
IBM	17100
W3Schools	17100

The above code is invalid because the column returned is not part of an aggregate. A GROUP BY clause will solve this problem:

```
SELECT Company,SUM(Amount) FROM Sales
GROUP BY Company
```

Returns this result:

Company	SUM(Amount)
W3Schools	12600
IBM	4500

HAVING...

HAVING... was added to SQL because the WHERE keyword could not be used against aggregate functions (like SUM), and without HAVING... it would be impossible to test for result conditions.

The syntax for the HAVING function is:

```
SELECT column,SUM(column) FROM table
GROUP BY column
HAVING SUM(column) condition value
```

This "Sales" Table:

Company	Amount
W3Schools	5500
IBM	4500
W3Schools	7100

This SQL:

```
SELECT Company,SUM(Amount) FROM Sales
GROUP BY Company
HAVING SUM(Amount)>10000
```

Returns this result

Company	SUM(Amount)
W3Schools	12600

The SELECT INTO Statement

The SELECT INTO statement is most often used to create backup copies of tables or for archiving records.

Syntax

```
SELECT column_name(s) INTO newtable [IN externaldatabase]
FROM source
```

Make a Backup Copy

The following example makes a backup copy of the "Persons" table:

```
SELECT * INTO Persons_backup
FROM Persons
```

The IN clause can be used to copy tables into another database:

```
SELECT Persons.* INTO Persons IN 'Backup.mdb'
FROM Persons
```

If you only want to copy a few fields, you can do so by listing them after the SELECT statement:

```
SELECT LastName,FirstName INTO Persons_backup
FROM Persons
```

You can also add a WHERE clause. The following example creates a "Persons_backup" table with two columns (FirstName and LastName) by extracting the persons who lives in "Sandnes" from the "Persons" table:

```
SELECT LastName,Firstname INTO Persons_backup
FROM Persons
WHERE City='Sandnes'
```

Selecting data from more than one table is also possible. The following example creates a new table "Empl_Ord_backup" that contains data from the two tables Employees and Orders:

```
SELECT Employees.Name,Orders.Product
INTO Empl_Ord_backup
FROM Employees
INNER JOIN Orders
ON Employees.Employee_ID=Orders.Employee_ID
```

SQL Syntax

Statement	Syntax
AND / OR	SELECT column_name(s) FROM table_name WHERE condition AND|OR condition
ALTER TABLE (add column)	ALTER TABLE table_name ADD column_name datatype
ALTER TABLE (drop column)	ALTER TABLE table_name DROP COLUMN column_name
AS (alias for column)	SELECT column_name AS column_alias FROM table_name
AS (alias for table)	SELECT column_name FROM table_name AS table_alias
BETWEEN	SELECT column_name(s) FROM table_name WHERE column_name BETWEEN value1 AND value2
CREATE DATABASE	CREATE DATABASE database_name
CREATE INDEX	CREATE INDEX index_name ON table_name (column_name)
CREATE TABLE	CREATE TABLE table_name (column_name1 data_type, column_name2 data_type, ...)
CREATE UNIQUE INDEX	CREATE UNIQUE INDEX index_name ON table_name (column_name)
CREATE VIEW	CREATE VIEW view_name AS SELECT column_name(s) FROM table_name WHERE condition
DELETE FROM	DELETE FROM table_name (**Note:** Deletes the entire table!!) *or* DELETE FROM table_name WHERE condition
DROP DATABASE	DROP DATABASE database_name
DROP INDEX	DROP INDEX table_name.index_name
DROP TABLE	DROP TABLE table_name
GROUP BY	SELECT column_name1,SUM(column_name2) FROM table_name GROUP BY column_name1
HAVING	SELECT column_name1,SUM(column_name2) FROM table_name GROUP BY column_name1 HAVING SUM(column_name2) condition value
IN	SELECT column_name(s) FROM table_name WHERE column_name IN (value1,value2,..)
INSERT INTO	INSERT INTO table_name VALUES (value1, value2,....) *or* INSERT INTO table_name (column_name1, column_name2,...) VALUES (value1, value2,....)

LIKE	SELECT column_name(s) FROM table_name WHERE column_name LIKE pattern
ORDER BY	SELECT column_name(s) FROM table_name ORDER BY column_name [ASC|DESC]
SELECT	SELECT column_name(s) FROM table_name
SELECT *	SELECT * FROM table_name
SELECT DISTINCT	SELECT DISTINCT column_name(s) FROM table_name
SELECT INTO (used to create backup copies of tables)	SELECT * INTO new_table_name FROM original_table_name *or* SELECT column_name(s) INTO new_table_name FROM original_table_name
TRUNCATE TABLE (deletes only the data inside the table)	TRUNCATE TABLE table_name
UPDATE	UPDATE table_name SET column_name=new_value [, column_name=new_value] WHERE column_name=some_value
WHERE	SELECT column_name(s) FROM table_name WHERE condition

Source : http://www.w3schools.com/sql/sql_quickref.asp